

✓ 1. A method of rendering a pencil-sketch image from three-dimensional data, comprising:

determining a pencil-sketch texture for a polygon defined by the three-dimensional data;

5 projecting the polygon onto a two-dimensional surface; and mapping the pencil-sketch texture onto the polygon to render the pencil-sketch image.

2. The method of claim 1, further comprising:  
10 obtaining a set of pencil-sketch markings; and constructing the pencil-sketch texture using the pencil-sketch markings.

3. The method of claim 2, wherein constructing comprises  
15 arranging the pencil sketch markings at a predetermined density such that the pencil sketch markings are at least one of parallel and perpendicular to one another.

4. The method of claim 1, further comprising:  
20 selecting a background onto which the pencil sketch image is rendered.

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5. The method of claim 1, wherein determining the pencil-sketch texture comprises:

obtaining a value based on a normal vector to the polygon and a light vector between the polygon and a light source;

5 classifying the polygon based on the value; and

associating the pencil-sketch texture with the polygon based on the classification of the polygon.

6. The method of claim 5, wherein the normal vector is a vertex normal of the polygon.

7. The method of claim 5, wherein the value is obtained by calculating the vector dot product of the normal vector and the light vector.

8. The method of claim 5, wherein the polygon is classified by associating the polygon with one of M ( $M \geq 1$ ) bins, each of the M bins corresponding to a predetermined range of values.

9. The method of claim 8, wherein the pencil-sketch texture is associated with the polygon based on which of the N bins into which the polygon falls.

10. The method of claim 1, wherein the three-dimensional data defines a three-dimensional model; and

the method further comprises:

5 re-positioning the three-dimensional model relative to the two-dimensional surface; and

repeating determining, projecting and mapping for a second polygon on the three-dimensional model to render a second pencil-sketch image.

10 / 11. An article comprising:

a readable medium that stores executable instructions to render a pencil-sketch image from three-dimensional data, the instructions for causing a machine to:

15 determine a pencil-sketch texture for a polygon defined by the three-dimensional data;

project the polygon onto a two-dimensional surface; and

map the pencil-sketch texture onto the polygon to render the pencil-sketch image.

20 12. The article of claim 11, further comprising instructions that cause the machine to:

obtain a set of pencil-sketch markings; and

construct the pencil-sketch texture using the pencil-sketch markings.

13. The article of claim 12, wherein constructing  
5 comprises arranging the pencil sketch markings at a predetermined density such that the pencil sketch markings are at least one of parallel and perpendicular to one another.

14. The article of claim 11, further comprising  
10 instructions that cause the machine to:

select a background onto which the pencil sketch image is rendered.

15. The article of claim 11, wherein determining the pencil-sketch texture comprises:

obtaining a value based on a normal vector to the polygon and a light vector between the polygon and a light source;

classifying the polygon based on the value; and

associating the pencil-sketch texture with the polygon  
20 based on the classification of the polygon.

16. The article of claim 15, wherein the normal vector is a vertex normal of the polygon.

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17. The article of claim 15, wherein the value is obtained by calculating the vector dot product of the normal vector and the light vector.

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18. The article of claim 15, wherein the polygon is classified by associating the polygon with one of  $M$  ( $M \geq 1$ ) bins, each of the  $M$  bins corresponding to a predetermined range of values.

19. The article of claim 18, wherein the pencil-sketch texture is associated with the polygon based on which of the N bins into which the polygon falls.

20. The article of claim 11, wherein the three-dimensional data defines a three-dimensional model; and  
the article further comprises instructions that cause the machine to:

re-position the three-dimensional model relative to the two-dimensional surface; and

repeat determining, projecting and mapping for a second polygon on the three-dimensional model to render a second pencil-sketch image.

✓ 21. An apparatus for rendering a pencil-sketch image  
from three-dimensional data, comprising:

a memory that stores executable instructions; and

5 a processor that executes the instructions to:

determine a pencil-sketch texture for a polygon  
defined by the three-dimensional data;

project the polygon onto a two-dimensional surface;  
and

10 map the pencil-sketch texture onto the polygon to  
render the pencil-sketch image.

22. The apparatus of claim 21, wherein the processor  
executes instructions to:

15 obtain a set of pencil-sketch markings; and

construct the pencil-sketch texture using the pencil-  
sketch markings.

23. The apparatus of claim 22, wherein constructing  
20 comprises arranging the pencil sketch markings at a  
predetermined density such that the pencil sketch markings are  
at least one of parallel and perpendicular to one another.

24. The apparatus of claim 21, wherein the processor executes instructions to:

select a background onto which the pencil sketch image is rendered.

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25. The apparatus of claim 21, wherein determining the pencil-sketch texture comprises:

obtaining a value based on a normal vector to the polygon and a light vector between the polygon and a light source;

classifying the polygon based on the value; and

associating the pencil-sketch texture with the polygon based on the classification of the polygon.

26. The apparatus of claim 25, wherein the normal vector is a vertex normal of the polygon.

27. The apparatus of claim 25, wherein the value is obtained by calculating the vector dot product of the normal vector and the light vector.

28. The apparatus of claim 25, wherein the polygon is classified by associating the polygon with one of M ( $M \geq 1$ )

bins, each of the M bins corresponding to a predetermined range of values.

29. The apparatus of claim 28, wherein the pencil-sketch texture is associated with the polygon based on which of the N bins into which the polygon falls.

30. The apparatus of claim 21, wherein the three-dimensional data defines a three-dimensional model; and

the processor executes instructions to:

re-position the three-dimensional model relative to the two-dimensional surface; and

repeat determining, projecting and mapping for a second polygon on the three-dimensional model to render a second pencil-sketch image.